93 (1901) *Sagittae.* Herr F. Schwab, of Ilmenau, announces variability in the star B.D. + 19°·3975 :—

$$\left.\begin{array}{llll} & \text{h.} & \text{m.} & \text{s.} \\ \text{R.A.} = & 19 & 14 & 26 \\ \text{Decl.} = & +19^\circ & 25'\cdot 4 & \end{array}\right\}(1900).$$

The variability is of the Algol type. Normally the star is about 6·5 magnitude, decreasing to nearly 9·0 magnitude, remaining here for some time and then rapidly increasing. At present there are not sufficient observations for stating a value for the period, but the light curve is similar to that of U Cephei, period 17 days. The last observed minimum was November 1 at 6·30 G.M.T. (*Astronomische Nachrichten*, Bd. 157, No. 3748).

Determination of Orbital Elements.—In the *Astronomical Journal* (vol. xxii. No. 510, pp. 43-52) Mr. F. C. Moulton gives a general analysis of a method of determining the elements of orbits of all excentricities from the data supplied by three observations of position, and illustrative examples of the application of the equations derived to the cases of elliptic and parabolic orbits.

THE INTERNATIONAL MEETING OF PHYSIOLOGISTS AT TURIN.

The fifth Triennial International Congress of Physiologists, which met at Turin in September, was the largest meeting of the kind that has assembled. The fine Institute of Physiology, under the direction of Prof. Angelo Mosso and belonging to the University, was put at the disposal of the Congress. In the neighbouring Institute of Histology was installed a museum for the exhibition of apparatus and preparations pertaining to physiology. The collection was extensive and important.

The number of communications announced for the sessions of the Congress was large enough to necessitate the institution of special accessory sittings. Sections were formed for Chemical Physiology and for Psycho-physiology. It is impossible in the space at our disposal to even mention all the material brought before the Congress, or to deal with any of the contributions fully. Preference was rightly given to communications illustrated by actual experiment or by actual preparations. A fuller verbal report has appeared in a special issue of the *Archives Italiennes de Biologie* (tome xxxvi. fasc. i.)

Among the communications coming under the head of Chemical Physiology the following may be noted.

Dr. Victor Henri (Paris) reported observations on the law of the quantitative action of sucrase. If a represent the quantity of saccharose at outset, and x the quantity inverted in a period equal to t, the action does not proceed in conformity with the logarithmic law admitted by authors, $K = \frac{1}{t}\log\frac{a}{a-x}$. The value of K does not remain constant during the reaction. The law in accordance with which the reaction proceeds corresponds with a formula, $K_1 = \frac{1}{t}\log\frac{a+x}{a-x}$. The *constant of inversion* K_1 varies with the concentration of the solution of saccharose a. The product aK_1 increases with a for weak concentrations (below 5 per cent.); it remains constant for concentrations of medium strength (5 per cent. to 25 per cent.) and diminishes when a increases above 25 per cent. The fact of having acted several hours and of being in a solution laden with invert sugar does not exert appreciable influence upon the activity of the sucrase.

Dr. Frederic S. Lee (New York) reported observations made by himself and Dr. C. C. Harrold on the influence of the ingestion of sugar upon *rigor mortis.* The prolonged administration of phloridzin to fasting cats causes the muscles to pass into *rigor* within a few minutes after death. If before death dextrose be given to such phloridzinised animals, the oncoming of *rigor* is delayed. The absence of carbohydrate from the muscle favours development of *rigor mortis*; it is, on the other hand, unfavourable to contraction.

Dr. F. S. Locke (London) demonstrated by a striking experiment the action of dextrose upon the activity of the mammalian heart. The heart removed from a freshly killed rabbit was washed free from blood and suspended freely, and arrangement made for recording its contractions by means of a lever attached to the apex. Kept at a temperature of 35° C., and fed with a modified Ringer's fluid, the contractions gradually grew feeble and ultimately very weak. If then oxygen under pressure were introduced into the fluid feeding the coronary arteries, the beats rapidly increased and remained good for an hour or so, and then once more diminished and failed. Dextrose then added to the feeding fluid to the extent of 1 per cent. restored the beat once more and it continued with hardly noticeable failure for ten hours or so. The beating fails at once if for the dextrose in the feeding fluid the oxygenated Ringer solution without any dextrose is substituted; but the beat is at once restored on returning again to the sugared fluid. Sucrose, lævulose and other sugars as yet tried fail to give evidence of this restorative power. The author must be congratulated upon the able and complete manner in which he demonstrated these important facts.

Prof. Albertoni (Bologna) communicated observations on absorption of various sugars from the stomach and intestine. The sugars (glucose, saccharose, lactose) were not absorbed in the ratio of their osmotic tensions. The absorption of lactose, whether in low tension or high tension solutions, was always less than for glucose or saccharose. In the intestine he always found a fluid of higher osmotic tension than the blood. During the absorption of sugar he found a slight increase of the osmotic tension of the blood.

Prof. Röhmann (Breslau) brought forward observations on the absorption of sugars from the intestine. Equal quantities of equally concentrated solutions of hexoses (glucose, galactose, mannose, fructose, and of pentoses (arabinose and xylose) placed in the small intestine (Vella's fistula) showed at the end of an hour loss by absorption of the different stereoisomeric sugars to very different extents. The absorption is, therefore, dependent, not only on the osmotic tension, but also on the configuration of the molecule of the sugar. The absorption of the disaccharides (saccharose, lactose and maltose) was further studied in respect to the extent to which their cleavage into monosaccharides went forward. It was found that a considerable though variable proportion of these disaccharides was absorbed without cleavage occurring in the intestinal canal. But an extract of the intestinal *mucosa* could produce the cleavage; probably the portion absorbed without being split up later underwent cleavage in the mucosa itself.

Dr. Nicloux (Paris) had studied the conditions of passage of carbonic oxide from the blood of the mother to that of the fœtus. He had employed for the determination of the quantities of the gas in the blood an accurate and delicate method elaborated in his previous experiments. When the percentage of CO in the air respired by the mother lay between $\frac{1}{10000}$ and $\frac{1}{1000}$, the quantities in the blood of mother and fœtus increased *pari passu* with increase of the percentage in the air respired, and the percentage in the fœtal blood was sensibly the same as in the maternal. With a percentage of above $\frac{1}{1000}$ of the gas in the respired air the identity of the percentage in the fœtal and maternal blood disappeared. This indicated a dissociation of the carboxy-hæmoglobin of the maternal blood at the placenta as a condition of passage across it. A simple experiment supports this view. A carp is placed in water to which has been added some oxycarbonated blood (dog's). The blood of the fish comes to contain a percentage of CO six or seven times greater than that of the medium of immersion. The animal shows no toxic effect from the immersion.

Dr. Pugliese (Bologna) had with Prof. Aducco found that the addition of sodium chloride to the water taken by fasting animals considerably increased their resistance to inanition. When the tissues of animals as similar as possible in other respects, but in the one case having water only, in the other salt and water, were analysed, the tissues under the latter condition were found to contain relatively the more water. Also the amount of water daily excreted by the animals receiving salt water was less than the amount of water excreted by those receiving water without salt.

Prof. A. Walther (St. Petersburg) demonstrated the action of Pawlow's *enterokinase* on fresh pancreatic juice as tested by digestion of measured quantities of fibrin. The conversion of the zymogen in the fresh juice into trypsin is not an oxidation process, for the *enterokinase* does not give the reactions of the oxidases, nor can the zymogen in the juice be rendered active by oxidising agents. The zymogen in the pancreatic juice is therefore not the same substance as Heidenhain's zymogen in extracts of the gland-tissue. The action of the *enterokinase* upon the zymogen is probably a hydrolytic one. From the fresh pancreatic juice a proteid (globulin?) can be precipitated which has extraordinary tryptic but no amylolytic power; but the amylolytic power of the juice remains in the juice after removal of the tryptic proteid.

Dr. O. Cohnheim (Heidelberg) reported experiments on the disappearance of peptones placed under the influence of the intestinal *mucosa*. The peptones were not changed to albumin, but were split up into crystalloid cleavage products. This cleavage was accomplished by a ferment *erepsin* produced by the intestine, and active on peptone but not on albumin.

Drs. Delezenne and Drouin (Paris) had investigated the question of the origin of the pepsin which is secreted in urine. They found that that pepsin might have either or both of two sources, α, the pepsin secreted by the stomach and presumably reabsorbed, β, the pepsin known to exist in the muscles, salivary and other glands and organs. The authors demonstrated that the urinary pepsin had its origin in the gastric pepsin, and was obtained by reabsorption of that pepsin from the stomach itself. (1) In the dog after removal of the stomach, never under any condition of nutrition or in any digestive period is any proteolytic ferment whatever detectable in the urine. (2) In the dog after establishment of a gastric fistula and the prevention of the entrance of gastric juice into the intestine, the urine, as usual, contains pepsin. (3) In the dog after exsection of the stomach, the introduction of gastric juice into the intestine fails to result in the appearance of pepsin in the urine.

Dr. Drouin (Paris) had made observations to test the part played by the spleen (Schiff, Herzen) in pancreatic digestion. He had, in the dog, united the œsophagus to the duodenum and converted the stomach into an independent *cul-de-sac* opening on the surface by a fistula. Thus he eliminated gastric digestion altogether and left pancreatic action the chief *rôle* in digestion. He had then excised the spleen. The excision produced no appreciable difference in the assimilative powers, digestive activity or general well-being of the animal. The removal of the spleen seemed, further, in no way to alter the quality or quantity of the juice secreted by the fistulous stomach.

Prof. Gley (Paris) gave a *résumé* of his experiments and conclusions regarding the *rôle* and mutual interdependence of the thyroid and the parathyroid glands. The evidence was both chemical and histological. He regarded the parathyroids as complemental in function and structure to the main thyroid. He referred to the work done recently by Mr. Walter Edmunds (London), and a fuller summary of his communication can be found in an admirable article published by Prof. Gley recently in the English medical journals.

Prof. V. Ducceschi (Rome) communicated researches dealing with aromatic groups in the proteid molecule. Cinnamic acid could be obtained from egg-albumin and serum-albumin by a method which did not in that way split up tyrosin. It came probably from the aromatic group whence proceed in the putrefaction of some proteids phenylacetic and phenylpropionic acids; probably that group is phenyl-α-amidopropionic acid. From 500 grm. of egg-albumin, 2 grm. of β-phenylacrylic acid (cinnamic acid) are obtained.

Among other communications given in this section were those dealing with the speed of absorption and of elimination of acetylene gas by the organism (Prof. Ugolino Mosso, Genoa), the presence of lower homologues of caffeine and theobromine in certain plants (Prof. Albanese, Pavia), the pharmacodynamic action of acetyl chloride (Prof. Spineanu, Bucharest), the formation of fat in the animal body (Prof. Boruttau, Göttingen), the diastatic action of human saliva (Dr. Oehl, Pavia), the osmotic tension of milk, urine and amniotic fluid (Drs. Vicarelli and Cappori, Turin), electromotive changes observed in solutions of oxalic acid under exposure to light (Dr. Querton, Brussels), the fatty components in lecithin (Dr. Henriquez, Copenhagen), the influence of intestinal absorption on the diurnal curve of output of urea (Dr. Slosse, Brussels), the microchemistry of the cell (Dr. R. Kohn, Prague), a method for determination of the acidity of the gastric juice (Levi and Lolli, Modena), hæmolysmometry (Dr. E. Buffa, Turin).

Electrophysiology was represented, as regards special communications to the meetings of the Congress, chiefly by the papers of Profs. Boruttan, Fano, Herzen, Mislawski, Waller, Wedenskii and Weiss. The first named (Göttingen) demonstrated capillary-electrometer photograms of the action current of the frog's nerve obtained during strychnine tetanus. The frequency of the rhythm was about eight times per second, and the relative slowness of the curve was explicable by the imperfect synchronism of the course of the individual waves. Prof. Boruttan could not accept Sir J. B. Sanderson's suggested explanation of these strychnine oscillations of the electrometer line, and proposed to call them pseudotetanic. He finally entered upon the question of the proper functional rhythm of the nerve-cell.

Prof. Herzen (Lausanne) dealt with the separation of the action-current of nerve from the functional "impulse" of nerve. He appealed to, among other data, that of Boruttan's strychnine experiment, in which, from a partially dried nerve trunk incapable of transmitting the impulses from the strychnised centres to the limb-muscles, the transmission of the action-current was still demonstrably obtainable.

Dr. Waller (London) gave in two complemental reports a well-illustrated demonstrational *résumé* of the more recent of his work on the electric response of living matter, both plant and animal, to general and to adequate stimuli. New points were added to those already familiar to English students of the question. A comprehensive search has been undertaken into the distributional width of the existence of this "reaction of vitality" which he regards as coextensive with life itself.

Among points established by him were the following:—Mechanical excitation of a petiole renders the excited part electropositive to the unexcited. The illuminated part of a leaf is electropositive to an unilluminated. Electric stimulation of uninjured vegetable tissues is followed by an electrical response which is abolished at high and low temperatures, by anæsthetic vapours, and in consequence of strong electric excitation. A general relation between magnitude of response and "vitality" of plant or plant organ is noticeable, the stronger the "vitality" the greater the voltage of the response. This in seeds is confirmed by subsequent germination. Plant tissues when submitted to stimulation of uniform magnitude at regular intervals exhibit the characteristic changes known in animal physiology as "peripheral fatigue" and "recovery," "staircase effect" and summation. In consequence of one or more strong induction currents, the electrical conductivity of living plant tissues is greatly augmented. Among his observations upon animal tissues may be cited the following. The skin of the cat's foot gives an electrical response to excitation of the sciatic nerve; this current is ingoing, it has a latent period of about three seconds and an E.M.F. of a hundredth of a volt. In the skin of the frog's foot it can be shown that atropin abolishes this indirect response to excitation of the nerve. The electrical response of healthy excised human skin to electrical excitation of both directions is outgoing. Human skin continues to exhibit the outgoing response characteristic of the living state for 1-10 days after excision. Immersion in hot water at once destroys irrecoverably the power of the skin to respond. The electrical response of the skin and of the eyeball to direct excitation is comparable with similar effects witnessed in electrical organs.

Dr. Weiss (Paris) showed that if two successive electric stimuli be applied to a nerve at the same point of the nerve, the direction of the electric currents applied is important in determining the summation of the stimuli. If the electric stimuli are both of the same direction and occur within the duration of the latent period, the effect of the one is demonstrably added to the effect of the other. If they are, however, of opposite direction the stronger of the two is alone effective, at least if the weaker is subliminal it produces no obvious effect. That is, if the stronger of the stimuli is of just liminal value it remains of just liminal value whether preceded or followed by the weaker of opposite direction. The addition to it of the weaker in nowise changes the result produced by the stronger on the nerve.

Prof. Wedenski (St. Petersburg) drew attention to observations, conducted in his laboratory, indicating the fundamental similarity of inhibition of nerve to narcosis of nerve. He maintained that all general excitants of nerve exhibit three successive phases of influence upon nerve—a phase in which the rhythm of the excitation exhibits modification in the rhythm of the response, a phase in which there is a depression of conductivity of the excited state, a phase of depression of all response to excitation.

Prof. Vitzou (Bucharest) gave an account of experiments instituted to test the supposed inexcitability of the grey matter of the spinal cord to artificial stimuli. He claimed that his experiments demonstrate that the spinal grey matter, like the cerebral grey matter, is excitable by faradic currents.

Prof. Mislawski (Kasan) gave a communication upon the negative variation of reflex action. Du Bois Reymond's discovery of the negative variation of strychnine convulsion, and Grützner's of that accompanying the spinal reflexes of the frog had shown the way to an electric examination of reflex action. His own observations exemplified how strictly the electric propagation through the reflex cell-chain conformed with the direction laid down by the Bell law of root-conduction. The electrical discharge in the reflex action he found to be an irregular one compounded of an irregular series of individual discharges.

Closely connected with such communications as these was a large group that may be classed as neurological. Prof. Langley (Cambridge) has begun an attempt to determine the group reactions to drugs and blood conditions of the different neurons which make up the nervous system. He demonstrated the stimulating action of nicotin on the neurons of the superior cervical ganglion in testimony of his view that that drug alters the cell-bodies (perikarya) of that ganglion. Since the suggestion of Carl Huber (Ann Arbor, U.S.A.) it has been customary to suppose that the incidence of action of nicotin in the sympathetic ganglia lies at the terminal fibrils of the preganglion neurons. Langley finds that if the preganglionic fibres are cut and allowed time for regeneration the local application of nicotin to the ganglion still produces its normal stimulating effect. Nicotin applied to a ganglion of the sympathetic chain causes erection of hairs only in the region supplied by the ganglion: if it stimulated the preganglionic nerve-endings axon-reflexes would move the hairs in other regions. Nicotin probably does not paralyse spinal ganglion cells; it does not stop the passage of impulses through the bipolar cells of the spinal ganglion of the skate. The erection of the hairs of the cat which occurs after asphyxia does not occur if the sympathetic pilomotor nerve-cells have been separated from the spinal cord; this blood stimulus acts, therefore, on the intraspinal pilomotor cells. Prof. Langley also spoke, in illustration of the same theme, of the effects of suprarenal extract on a number of tissues and organs where he had examined its action. His new results, together with others previously ascertained, showed that in all cases the extract produces an effect of the same kind as that produced by stimulation of the sympathetic nerve, and not like that produced by a cranial or sacral autonomic nerve. Notwithstanding this the action of the extract appears to be directly upon the tissue, not upon the sympathetic nerve-endings; thus it produces pallor and secretion of the submaxillary gland, and this after degeneration of the post-ganglionic fibres of the cervical sympathetic. The inhibitory effect of the vagus upon the cardiac sphincter of the stomach was demonstrated to the meeting.

Prof. Langendorff (Rostock) reported upon restoration of function which had occurred 105 days after total extirpation of the superior cervical ganglion of the cat. The signs of paralysis in the eye had then nearly passed off; they returned at once on section of the sympathetic nerve in the neck. Electrical excitation of the upper end of the cut nerve-trunk gave strong dilatation of the pupil, and palpebral fissure and retraction of *membrana nictitans*. Microscopical examination failed to reveal any reappearance or regeneration of the ganglion, but the sympathetic fibres must have found their way to their appropriate end-stations.

Dr. Bottazzi (Florence) reported observations on the innervation of the viscera in certain crustacea and in elasmobranchs. His communication was illustrated by a number of anatomical preparations and photograms showing the disposition of the nerve-trunks and the structure of the ganglia.

Dr. Marenghi (Pavia) demonstrated rabbits in which he had performed—as in one case was proved to the meeting by autopsy of an animal—intracranial section of the optic nerve, and still found persistence of reaction of the pupil to light and shade. The reaction was feeble and sluggish, but indubitable.

Prof. Flechsig (Leipzic) gave a very complete demonstration of preparations recording the history of the myelinisation of the nerve-fibres of the human brain. He described at considerable length, with the aid of projected slides, his views regarding the functional arrangement of different areas of the cortex cerebri. Cortical fields to the number of thirty-six, uniform in extent and distribution in different individual brains, can be mapped out by the myelogenetic method. These fields are divisible chronologically into three groups: primary 1–10, intermediate 11–31, terminal 32–36. The primary fields included the seats of cortical representation of all the senses. The myelinisation in each of the fields begins fairly contemporaneously throughout it and does not begin from a single point in it; neither the size of the nerve-fibres nor the vascularity of the tissue conditions the myelinisation of the area. Each primary field possesses a couple of well-defined conjugated tracts, one proceeding to it—cortico-petal and the earlier to myelinate—the other proceeding from it—corticofugal and the later to myelinate. The primary fields possess each a corticofugal tract which proceeds to regions non-cortical. The intermediate and terminal fields possess no such "projection" tracts. Prof. Flechsig regards both the cingulum and the fasciculus longitudinalis inferior as projection tracts from two of his primary fields; he believes, as Prof. W. H. Thompson has previously urged, that the latter tract connects the cortical visual field with the *corpus geniculatum laterale*. The intermediate fields, on the other hand, are rich in long association fibres leading to connection with other regions of the cerebral cortex.

Drs. Z. Treves (Turin) and A. Aggazzotti (Turin) reported the interesting results of an attempt to train the flight of a pigeon whose cerebral hemispheres had been removed. The bird, with another whose hemispheres were similarly removed at the same time, was allowed at first to remain, as pigeons after ablation of the hemispheres do, perched almost motionless on their wooden perch. The top of the perch offered an area some five centimetres by four. After some days it was removed from the top of the perch and placed about five centimetres from it, and was pushed towards it and in various ways incited to fly up to it. In fifteen days it began to take a short but fairly perfect flight to the perch-top. The distance was increased gradually by five centimetre increments. In five months' time by daily training the distance of flight had been extended to about eight metres. Sometimes the course of the flight was straight, often it was not so. Resting places were introduced sometimes not in a direct line to the perch in the cage. In six months' time progress had been made so far that the bird when thrown into air in a direction away from the cage orientated itself promptly and turned its flight in that direction. In nine months' time the bird flew regularly and well to the perch in the cage from any quarter of the room and when started in any direction. It, however, never once flew down from, or indeed left, its perch of its own accord, nor did it ever feed itself. From Turin it was taken to Modena for a fortnight and made to learn other exercises. On being brought back to Turin and liberated in its room it at once flew back to its cage and mounted its platform. It seemed to possess memory. The companion bird, to whom no training was given, at the end of nine months did not, when placed close to its perch and incited to fly to it, respond by flight, nor could it of itself, when placed just outside the cage, fly into the cage. Both birds retained throughout the strange huddled appearance and attitude characteristic of the pigeon after removal of the cerebral hemispheres.

Dr. A. S. Grünbaum and Prof. Sherrington (Liverpool) demonstrated a number of brains and cord-sections of anthropoid apes on which they had been investigating points in the physiology of the "motor area." Both excitation, by faradic electricity, and ablation had been employed. In view of the near approach of these brains to the configuration of the human it became obvious that the determination of the topography of the excitable and other areas must be in them of considerable practical importance to the study of human cerebral disease. They had at outset of their work been surprised to meet with results at variance with the topography generally accepted as probably obtaining in man. It had to be remembered, however, that the generally accepted topography was based chiefly on results obtained in the lower, not in the higher, apes, and that of the anthropoid apes only a single species, and that by a single specimen only, had previously been laid under experimental contribution. Their own experiments, embracing observations upon a series of chimpanzees as well as on the orang and the gorilla, were completely unanimous in denying any extension of the "motor region" to the surface behind the Rolandic fissure. Nor had they found the fissures in the motor region inexcitable, as had been asserted for the cortex of the orang, or that the motor region of the anthropoid required faradic currents much stronger than those required for the lower monkeys. A number of details were shown and dealt with in the communication, account of which limits of space preclude our here doing justice to. A chimpanzee taken to the Congress for actual demonstration of the excitation effects became ill on the journey and succumbed before experiment could be undertaken. We may remark that the research showed more clearly than evidence hitherto accessible that in the motor region of these complexly folded higher brains the cortical fissures do not coincide with functional boundaries in the cortex, and that they do not, indeed, bear any accurately constant relation whatsoever to the functional topography. They are, with the exception of the Rolandic fissure itself, quite insecure landmarks to the details of the spatial arrangement of the functional "centres."

Prof. Nicolaides (Athens) demonstrated to the meeting two dogs in which he had performed bilateral vagotomy several months previously. He pointed out the remarkable subsidence of the symptoms that had occurred. His results, especially in regard to recovery from dyspnæic attacks, had, he contended, been considerably more favourable than those obtained by Pawlow.

Dr. Bayliss (London) gave an excellent demonstration of the antidrome vascular dilatation obtainable from the posterior spinal roots of the nerves of the pelvic limb. The excitation may be electrical, mechanical, chemical or thermal. The experiments leave no doubt that the vascular dilatation is brought about by impulses passing centrifugally along fibres of the sensory nerve-root, which, like the other fibres of that root, have their perikarya in the root-ganglion outside the cord. The fibres do not enter the sympathetic system, but proceed direct to the limb. Reflex vaso-dilatation of the limb can be produced after extirpation of the abdominal sympathetic, *i.e.* after all the vaso-constrictors have been removed; this dilatation must therefore be by means of vaso-dilator nerves which go to the limb through the hindmost three lumbar and first sacral nerves. Similarly, vaso-dilator fibres pass to the forelimb by the hindmost three cervical and first thoracic nerves.

Dr. Bocci (Siena) showed tracings demonstrating the diminution in the excitability to electric stimuli of the nerves of the frog produced by destruction of the spinal cord.

Dr. S. A. Dontas (Athens) demonstrated the different character and the greater degree of mechanical elasticity possessed by a muscle before than after poisoning by curare.

Drs. Negro and Z. Treves (Turin) demonstrated graphic records of the willed muscular contractions performed by a patient suffering from Parkinson's disease (*Paralysis agitans*). These records showed that the oscillations which, as Schäfer and v. Kries have shown, normally characterise willed contractions and normally succeed at a rate of 10–12 per second in the patient with *morbus Parkinsonii*, occur at a rhythm of only 5–6 per second.

Dr. Demoor (Brussels) showed preparations illustrating some remarkable sequelæ to trepanning in young animals. The brain had been in some way injured at the operations, yet at the end of about five months wasting of the body with epileptiform seizures ensues and death soon follows. The cells of the cerebral cortex are found to be in a condition of chromolysis with a moniliform degeneration of their dendrites.

Other communications dealt with the differential reaction of muscle and nerve (Mdlle. Joteyko, Brussels), graduation of the effects of fatigue (Mdlle. Joteyko, Brussels), the *rôle* in respiration of the sensory nerves of the diaphragm (Mislawski, Kasan), cerebellar tonus (A. Moscucci, Siena), the coordination of antagonistic muscles (Victor Henri, Paris), the phenomenon of Bell (C. Negro, Turin), conditions favourable and unfavourable to hypnosis in the frog (M. Stefanowska, Brussels). Among contributions to method may be mentioned Dr. Treves's improvements in the ergograph of Mosso, Dr. Broca's (Paris) apparatus for obtaining constant condenser discharges at any desired rate of frequency, and Dr. Corona's ingenious trephining instrument.

Among communications dealing with muscle may be cited Dr. F. S. Lee's (New York) observations with Dr. W. Salant on the influence of doses of alcohol upon the contractions of the directly excited isolated muscles of the frog. It was found that alcohol in minute doses seemed to favour the response of the muscle, in larger doses it was obviously deleterious. Dr. J. Demoor (Brussels) demonstrated his method and some of his results upon the dissociation of contraction and conduction in the muscle of the frog. The muscle is surrounded with plaster of Paris for half its length. The electrodes being placed on the free part of the muscle, a series of contractions in that free part is provoked and repeated to the production of fatigue. The plaster is then broken from the other half of the muscle and that half is found to be quite unaffected by fatigue. If the stimulating current be applied to the part within the mould instead of to that outside, the latter contracts in response to the stimulation and can be reduced to inexcitability by fatigue. But the part inside the mould, although it has served as conductor to the fatigued part, is found to have remained inappreciably affected by fatigue. Prof. Huerthle (Breslau) demonstrated a series of remarkable microphotograms of muscle fibre at rest and in contraction, examined under illumination by homogeneous light and by plane polarised light with an analyser.

Prof. Langendorff (Rostock) had examined the direction and speed of the conduction of the contraction-wave over the heart by applying to the surface of the isolated and artificially fed cat's heart two rheoscopic muscle-nerve preparations from the frog. The two preparations were 2 to 3 centimetres apart. The wave of negativity was found to sweep usually—if heart were beating well—from the base toward the apex, at a speed of 2 metres per second. If the heart were beating badly it might be as slowly propagated as $\frac{1}{2}$ metre per second.

Prof. Blix (Lund) demonstrated apparatus devised for myothermal experiments on excised frog muscle; and apparatus for a similar purpose was also demonstrated by Dr. Bürker (Tubingen). Prof. Blix also showed a new form of induction excitator used by him in his more recent work on the summation of twitches.

Dr. Negro (Turin) demonstrated a fine series of microscopical specimens displaying the motor end-plates in mammalian and reptilian muscle-fibres.

Prof. Grützner (Tubingen) communicated the results of an investigation he had conducted upon the movements of the contents of the stomach and the regional distribution of the acidity of the semi-fluid mass of food occupying the cavity of the organ. The method employed had been rapid removal and freezing of the viscus and then its examination by frozen sections cut in various planes. When solid or semi-solid food is taken, that which is later introduced is always found toward the centre of the cavity of the organ. The contents of the pyloric end were always well acidified throughout, those of the cardiac end only in the layers nearest to the mucosa. The movements of the stomach seem to result in the food being deposited in layers upon the surface of the mucosa and that layer next to the mucosa being shifted toward the pylorus.

Prof. Zuntz (Berlin) described the methods employed by himself and his four colleagues, Caspari, Waldenburg, Lœwy and Kohner, in their recent research into the chemical metabolism of the body at high altitudes, namely on Monte Rosa. Dr. v. Schrötter (Vienna) reported his observations of some of the physiological phenomena attending a balloon ascent to an altitude of 7500 metres.

Of experiments dealing with the circulation, a large number were demonstrated. Prof. Hürthle (Breslau) demonstrated his new Stromuhr in action on the living animal, also a number of the graphic records obtained by it. These proved (1) increase in speed of flow of the blood in the carotid, produced by compression of the opposite carotid, (2) increase by section of the vago-sympathetic, (3) slowing of the blood stream in the crural artery as a result of tetanisation of the limb muscles by stimulation of their nerves, (4) the blood stream in the arteries as measured by the volume of blood flowing along the channel in a given time increases, not in simple proportion to increase of the arterial pressure, but in much greater ratio, *e.g.* blood pressure 87 mm. Hg., stream volume 400 mm^3., b. press. 131 mm. Hg., stream volume 1000 mm^3., b. press. 161 mm. Hg., stream volume 1500 mm^3.

Dr. T. G. Brodie (London) demonstrated a new method for investigation of effect of drugs on the mammalian heart. The mean pressure against which the heart works is kept constant and the work determined by the product of the output and of the mean pressure. An automatically working "Stromuhr" registers the output. Of the results obtained, especially noteworthy were those concerning anæsthetics. Chloroform depressed the working capacity vastly more than did ether or ethylene chloride. Suprarenal extract much increased the amount of work performed by the heart, as also its rate of beat. Suprarenal extract acts as an antidote to chloroform. If administered before chloroform it is found that the heart can withstand much larger doses of chloroform. Moreover, a heart deeply injured by chloroform will rapidly and completely recover if suprarenal extract be administered. It had in the course of the research been constantly found that the heart was very sensitive to the blood of different mammalian species, thus the heart of the dog went quickly into fibrillar incoordination unless fed with dog's blood; ox blood and other kinds of blood acting deleteriously at once. Dr. Brodie also showed his apparatus for the recording of the lung volume. He employs a plethysmographic method, which he demonstrated in use. Dr. Dixon (Cambridge) is his collaborator in the research not yet completed, for which the apparatus was designed.

Prof. Fano (Florence) described at some length a series of electrometer photograms registering electromotive phenomena of the heart beat. The photographic records shown in illustration of several new points he brought forward were particularly fine specimens of what such records can be in the hands of the skilful.

Prof. Moussu (Alfort) had studied the lymph flow in the limbs of the larger animals (horse, ox, &c.) during physiological repose and inaction, and then under conditions of local vasoconstriction and vasodilatation and under those of general augmentation of blood pressure and of copious venous depletion. He had further observed the lymph flow under the influence of muscular work and under conditions of great activity of the tissues in general. A very large series of observations was presented in a number of tables together with diagrams of the apparatus employed for measuring the quantities of mechanical work given by the animals in certain of the experiments dealing with the effect of muscular activity. The conclusions arrived at were (1) that the lymph is not the simple product of a transudation from the blood plasma through the capillary wall under the mechanical pressure of the blood-circulation; (2) that filtration is always quite a minor factor in the production of lymph; (3) that the lymph is mainly a product of the tissues comparable to a secretion from them; (4) that the quantity of its production is in direct relation to the functional activity of the tissues; (5) that the peripheral (limb) lymphatic apparatus is in large measure an apparatus for excretion.

Prof. Stirling (Manchester) demonstrated his simple and successful method of injecting the sublingual lymph-sac of the frog and of applying drugs to the muscles related to it. Fluid, *e.g.* solution, of Berlin blue is injected under slight pressure into the dorsal lymph-sac and finds its way to the sac below the tongue. Excellent anatomical preparations are thus obtainable; drugs, *e.g.* veratrin, may thus be applied directly to the hyoglossus *in situ.*

Prof. Kemp (Illinois) on behalf of Miss Calhoun and himself made an interesting communication upon blood-platelets and their relation to coagulation of the blood-plasma. After thorough control of the method for fixing the platelets they attempted their methodic enumeration. The number varied between 961,500 and 730,000 per cub. mill. in man; a larger number than they found in dogs. The authors confirmed Bizzozero's observation that if the blood of the living dog be reduced to an incoagulable condition by repeated "whippings" and reinjections the incoagulable blood contains no platelets. But it contains some, though few, leucocytes. The authors find that in normal clotting the blood-platelets break down, the leucocytes do not. The fibrin filaments radiate from disintegrating blood-platelets at the nodes of the network they form.

Prof. Hédon (Montpellier) showed that the hæmolytic glucosides are more globulicidal in saline solutions than in serum. Substances therefore exist in the serum that may be regarded as protecting the red corpuscles against the toxicity of these glycosides. A little serum added to the water in which they are swimming protects tadpoles against the toxicity of glycosides (saponine, cyclamine) that are otherwise violently poisonous for them. Similarly, acid sodium phosphate protects the red corpuscles from the action of solanine and protects fish if added to the water of the aquarium.

The large attendance of active workers in the field of sense-organ physiology and in pyscho-physiology was a notable feature of the Congress, and the communications made upon those subjects were numerous. Dr. Tschermak (Halle) gave a lucid account of interesting and exact work upon the extent of the binocular field of vision in various vertebrate types. Prof. Hensen (Kiel) demonstrated experiments in evidence of an accommodation mechanism for the ear. Prof. Cavazzani (Ferrara) demonstrated an instrument for the estimation of the visual purple. Dr. Sante de Sanctis (Rome) reported the results of prolonged researches upon the depth of sleep. The stimulus required to break sleep was found usually to be greatest in the first half of the second hour. The increase of stimulus required to pass from provocation of a subconscious reaction to actual waking amounted on an average to three degrees of the scale of the Griessbach æsthesiometer. Prof. Osawa (Tokio) described observations indicating that most monkeys are right-handed, only a few left-handed; that birds, on the other hand, are usually left-footed. Drs. Broca and Sulzer (Paris) communicated a research into the latent period for visual acuity. Dr. S. Vaschide (Paris) had made numerous measurements of the simple reaction time for olfactory sensations. Dr. Marco Treves (Turin) reported observations on the thermo-esthesiometry of the various mucous membranes accessible to external examination. The sensitivity was in all cases found to be markedly less than is that possessed by the skin. The mucosa of the urethra and of the cervix uteri were quite incapable of heat and cold sensations, and even the cautery excited only slight, and that painful, sensation from them.

Dr. Kiesow (Turin) brought forward observations proving that the laryngeal aspect of the epiglottis is endowed with sentiency for taste, and so also the greater part of the mucosa lining the interior of the larynx itself. The whole of the soft palate (but not the hard palate) and the back of the pharynx were found endowed with taste. On the other hand, taste sensations could not be evoked from the uvula, the tonsils, the anterior or posterior pillars of the fauces. In regard to other species of sense, the uvula, tonsils and pillars of the fauces were found to be very defective in regard to touch and temperature stimuli, but fairly responsive as regards "painful"; the combination of sense-organs is in this respect almost the converse of that obtaining on inner surface of the cheek. Dr. Kiesow gave further communications upon the "temperature spots" of the skin. He laid stress upon the considerable amount of evidence that the "cold spots" lie much nearer the surface of the skin than do the "hot spots." Regarding the topographical distribution of the spots, his own very extensive observations differed in no important respect from those of Blix and Goldscheider, but in detail agreed better with those of the former, although he did find the cold spots rather more sparse than had Blix.

Dr. Kiesow also brought forward an important result for which his observations on "touch spots" gave basis, namely, that the value of the median threshold of the touch spot is within narrow limits practically the same for all touch spots the whole body-surface over. This is in strong contrast to the wide variation which the median threshold for pain exhibits. This discovery is of much significance for the analysis of spatial perception.

Among those present, in addition to those mentioned above, were Profs. Aducco (Pisa), Albanese (Pavia), Albertoni (Bologna), Axenfeld (Perugia), de Burgh Birch (Leeds), Bohr (Copenhagen), Bowditch (Boston), Chauveau (Paris), v. Cyon (Territet), Dastre (Paris), Dupuy (Paris), Ebbinghaus (Breslau), Einthoven (Leyden), Fano (Florence), Foster (Cambridge), Fredericq (Liege), Gad (Prague), Gaule (Zurich), Gley (Paris), Golgi (Pavia), O. S. F. Grünbaum (London), Héger (Brussels), Henriquez (Copenhagen), Hering (Prague), Hopkins (Cambridge), Johansson (Stockholm), Kossel (Heidelberg), Kronecker (Berne), Laulanié (Toulouse), Lépine (Lyons), Lombard (Ann Arbor, U.S.A.), Luciani (Rome), Marey (Paris), Nicolaides (Athens), Oehrwall (Upsala), Onimus (Munich), Osawa (Tokio), Perroncito (Turin), Physalix (Paris), Prévost (Geneva), Querton (Brussels), Sergi (Rome), Shore (Cambridge), Sowton (Liverpool), Stafford (Nottingham), Starling (London), Stefani (Padua), Stirling (Manchester), v. Tarchanow (St. Petersburg), Thompson (Belfast), Tigerstedt (Helsingfors), Toulouse (Paris), Tschermak (Halle), v. Uexkull (Naples), Verworn (Göttengen), Vintsgau (Innsbrück), Welby (London). The Congress was more numerously attended than any previous one. The courtesy and hospitality of their Italian colleagues will always remain a memory with the members present. The Italian committee consisted of Profs. Aducco, Cavazzani, Corona, Fano, Luciani, Angelo Mosso, Patrizi, Sertoli and Stefani. Drs. Treves and Herlitzka proved indefatigable local secretaries. The Italian language was an official language for the Congress, and it was formally decided that it should henceforth remain so.

ON A LATE PLEISTOCENE DEPOSIT CONTAINING MAMMOTH.

AMONG the districts in which there is a fair probability of obtaining satisfactory evidence as to the sequence of events which have occurred since the glacial episode, there is none more promising than the northern part of East Anglia, nor is there any region where the history of that early post-Glacial age, if it could be clearly made out, would throw light upon so many vexed questions in geology.